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INSPEC - 1969 to date (INZZ)

Accession number & update
7717561, B2003-10-4360E-005; 20030901.

Title
Vibration imagery of remote objects.

Author(s)
Ebert-R-R; Lutzmann-P.

Author affiliation
Forschungsinstitut fuer Optronik und Mustererkennung, FGAN-FOM, Ettlingen, Germany.

Source
Free-Space Laser Communication and Laser **Imaging** II, Seattle, WA, USA, 9-11 July 2002.
Sponsors: SPIE.
In: Proceedings-of-the-SPIE-The-International-Society-for-Optical-Engineering (USA), vol.4821, p.1-10, 2002.

CODEN
PSISDG.

ISSN
ISSN: 0277-786X, CCCC: 0277-786X/02/ ($15.00).

Availability
SICI: 0277-786X(2002)4821L.1:VIRO; 1-P.

Publication year
2002.

Language
EN.

Publication type
CPP Conference Paper, J Journal Paper.

Treatment codes
A Application; P Practical; T Theoretical or Mathematical; X Experimental.

Abstract
Laser vibrometry based on coherent detection technique allows to measure **vibration** characteristics

of objects, based on its high Doppler resolution. Point targets were measured up to 40 km under medium turbulence conditions. Specifically **vibration imaging** offers an extensive potential for short-range civil applications and for long-range target classification and identification. For short range applications (up to few meters distance) laser vibrometry is used for investigating and testing of all kind of mechanical structures with respect to their **vibration** characteristics. Laser-Doppler based acoustic-to-seismic detection of buried mines shows a potential of this attractive technique at short range, mostly based on lambda = 632 nm (HeNe laser). At longer ranges, the wavelengths of lambda =.10.6 mu m (CO/sub 2/ laser) and lambda = 1.5 mu m (erbium fiber laser) are of interest, because of laser safety and better beam propagation through the atmosphere. Examples of the vibrometry technique with and without spatial resolution capability are shown here. (3 refs).

Descriptors

landmine-detection; light-coherence; measurement-by-laser-beam; optical-signal-detection; vibration-measurement.

Keywords

vibration imagery; remote objects; laser vibrometry; coherent detection; **vibration** characteristics measurement; Doppler resolution; point targets; medium turbulence conditions; short range civil applications; long range target classification; long range target identification; mechanical structures; laser Doppler based acoustic to seismic detection; buried mines; erbium fiber laser; laser safety; laser beam propagation; helium neon laser; carbon dioxide laser; 632 nm; 10.6 micron; 1.5 micron; 40 km; CO2; HeNe.

Classification codes

B4360E (Metrological applications of lasers).
B7320G (Mechanical variables measurement).
B6140M (Signal detection).
B6135 (Optical, image and video signal processing).

Chemical indexing

CO2 bin, O2 bin, C bin, O bin; HeNe bin, He bin, Ne bin.

Numerical indexing

distance: 4.0E+04 m;
wavelength: 6.32E-07 m, 1.06E-05 m, 1.5E-06 m.

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http://dx.doi.org/10.1117/12.452042.

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INSPEC - 1969 to date (INZZ)

Accession number & update
6906755, B2001-06-6320C-016; 20010401.

Title
Laser radar based **vibration imaging** of remote objects.

Author(s)
Lutzmann-P; Frank-R; Ebert-R-R.

Author affiliation
Forschungsinst fur Optronik und Mustererkennung, Kressbash, Germany.

Source
Laser Radar Technology and Applications V, Orlando, FL, USA, 26-28 April 2000.
Sponsors: SPIE.
In: Proceedings-of-the-SPIE-The-International-Society-for-Optical-Engineering (USA), vol.4035, p.436-43, 2000.

CODEN
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ISSN
ISSN: 0277-786X, CCCC: 0277-786X/2000/ ($15.00).

Availability
SICI: 0277-786X(2000)4035L.436:LRBV; 1-R.

Publication year
2000.

Language
EN.

Publication type
CPP Conference Paper, J Journal Paper.

Treatment codes
A Application; P Practical; X Experimental.

Abstract
The technique of laser vibrometry is used to generate **vibration** images, i.e. data cubes where the

target **vibration** amplitude distribution across the target, for a given **vibration** frequency, is mapped onto the x-y-plane, and frequency varies along the z-direction. Sample **vibration** images were taken by laser radars at lambda equals 10.6 micrometer (CO/sub 2/ laser) and lambda equals 1.54 micrometer (erbium fiber laser) at ranges over 1 km. The first ever taken **vibration** images of motorized vehicles at such distances are presented. **Vibration** imagery offers new possibilities for target classification, and for investigating and monitoring **vibration** behavior of large scale structures. Experimental and theoretical comparisons of laser vibrometry techniques with and without spatial resolution capability are presented. (3 refs).

Descriptors

image-classification; optical-radar; radar-imaging; remote-sensing-by-laser-beam; vibration-measurement.

Keywords

laser radar based **vibration imaging;** remote objects; laser vibrometry; **vibration** image generation; data cubes; target **vibration** amplitude distribution; **vibration** frequency; **vibration** images; carbon dioxide laser; erbium fiber laser; motorized vehicles; target classification; **vibration** monitoring; large scale structures; spatial resolution; 10.6 mum; 1.54 mum; CO2.

Classification codes

```
B6320C    (Optical radar).
B4360E    (Metrological applications of lasers).
B7320G    (Mechanical variables measurement).
B6135     (Optical, image and video signal processing).
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Chemical indexing

CO2 bin, O2 bin, C bin, O bin.

Numerical indexing

wavelength: 1.06E-05 m, 1.54E-06 m.

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Impagliazzo, J.; Medeiros, M.; Kay, S.;
OCEANS, 2001. MTS/IEEE Conference and Exhibition , Volume: 1 , 5-8 Nov. 2
Pages:22 - 25 vol.1

[Abstract] [PDF Full-Text (394 KB)] **IEEE CNF**

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Kleeman, L.; Kuc, R.;
Robotics and Automation, 1994. Proceedings., 1994 IEEE International Confer on , 8-13 May 1994
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Arvelo, J.I.; Zabal, X.A.;
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Pages:1596 - 1610

[Abstract] [PDF Full-Text (1088 KB)] **IEEE JNL**

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Schock, S.G.; Tellier, A.; Wulf, J.; Sara, J.; Ericksen, M.;
Oceanic Engineering, IEEE Journal of , Volume: 26 , Issue: 4 , Oct. 2001
Pages:677 - 689

[Abstract] [PDF Full-Text (424 KB)] **IEEE JNL**

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Ultrasonics, Ferroelectrics and Frequency Control, IEEE Transactions on , Volu 39 , Issue: 4 , July 1992
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